ALAMEDA COUNTY
CONGESTION MANAGEMENT AGENCY

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Memorandum

April 23, 2009
Agenda Item 6.5.3

DATE: April 14, 2009

TO: CMA Board

FROM: Plans and Programs Committee

SUBJECT: I-580 and I-680 Express Lane Project Pre-Project Existing Conditions Reports

Action Requested
It is recommended that the Board accept the *I-580 Express Lane Project Before Study – Final Existing Conditions* and *I-680 Express Lane Project Before Study – Final Existing Conditions* Reports. A second evaluation will be conducted once the Express Lanes are open to traffic, but not later than three years after the first revenues are collected so that performance of the Express Lane can be evaluated. The After Report, comparing the before and after conditions, will then be submitted to the Board and the Legislature as required in Streets and Highways Code Section 149.5(g). The Sunol Smart Carpool Lane Joint Powers Authority Governing Board approved the *I-680 Express Lane Project Before Study – Final Existing Condition Report* at its April 13, 2009 meeting. Both Reports were mailed to the Board with the Plans and Programs Committee agenda and are posted on the ACCMA's website.

Discussion
The *I-580 Express Lane Project Before Study – Final Existing Conditions and I-680 Express Lane Project Before Study – Final Existing Conditions Reports* present the goals, objectives, and evaluation results for the "Before" Express Lane conditions. The purpose of the Before Study is to document existing conditions to establish a benchmark for the operation of the existing mixed flow lanes and existing and proposed carpool lanes on I-580 and I-680 prior to the implementation of the Express Lanes.

The evaluation of the Express Lanes is required by Streets and Highways Code Section 149.5 (g) which states:

Not later than three years after the administering agency first collects revenues from the program authorized by this section, the administering agency shall submit a report to the Legislature on its findings, conclusions, and recommendations concerning the demonstration program authorized by this section. The report shall include an analysis of the effect of the HOT Lanes on the adjacent mixed flow lanes and any comments submitted by the Departments of Transportation and California Highway Patrol regarding operation of the lane.

In August 2008, the ACCMA retained the services of Dowling Association, Inc. to develop the goals and objectives, the evaluation plan, collect the data and prepare the attached Existing Conditions Reports for both the I-580 and I-680 corridors. An After Conditions Report will be prepared in accordance with the requirements of Streets and Highways Code Section 149.5 (g) and will be brought back to the Board at that time.

The Before and After evaluations will provide feedback on the performance of the system, particularly in relation to the overall goals of the Express Carpool Lane Project, which are to:

- Optimize the HOV lane usage to improve traffic throughput in the corridor
- Utilize this new revenue stream to help pay for transportation improvements and transit operations in the corridor
- Maintain LOS C or better for all Express Lane users
- Improve highway and transit in the corridor with revenues generated
- Employ new Intelligent Transportation System (ITS) technologies such as dynamic pricing and in-vehicle electronic enforcement

The following data was collected:

- Traffic volume surveys on freeway mainline and ramps
- Vehicle occupancy surveys
- Travel time data
- Transit ridership
- Accident data

The following conditions, described below and shown in Table 1, were observed for I-580 eastbound and westbound:

Travel speed:
I-580 eastbound: I-580 eastbound operated at free flow conditions during the morning commute hours and experienced heavy congestion from the I-680 Interchange to the Fallon Road and Airway Boulevard interchanges during the afternoon commute hours.

I-580 westbound: I-580 westbound is the peak direction of travel during the morning commute hours with significantly reduced freeway speeds from the Greenville Road interchange to the Fallon Road interchange. Near the I-680 interchange, freeway speeds were also affected by the heavy weaving activities and high demands exiting to I-680. The corridor operated at free flow speeds during the afternoon commute hours.

Travel time reliability:
I-580 eastbound: During the hours of 4:00 to 6:00 p.m., the I-580 eastbound corridor has the longest travel time at 24 minutes. The travel time in the non-peak direction is about 14 minutes.

I-580 westbound: During the hours of 6:00 to 9:00 a.m., the I-580 westbound corridor has the longest travel time ranging from nearly 20 minutes to 22 minutes. The travel time in the non-peak direction is about 14 minutes

Vehicle occupancy:
I-580 eastbound: In general, carpool vehicles with two or more passengers make up 17 to 20 percent of the total traffic composition. Truck traffic varies between 10 and 13 percent along the corridor.

I-580 westbound: In general, carpool vehicles with two or more passengers make up 12 to 24 percent of the total traffic composition. Truck traffic varies between 8 and 12 percent along the corridor.

Transit vehicles and passengers: Transit ridership in the study corridor is highest on the freeway segment that connects Dublin/Pleasanton to Livermore, which can be attributed to the Dublin/Pleasanton BART station. Average daily transit ridership in the corridor ranges from 729 riders per day between I-680 and Hacienda to 1,779 between Tassajara and Airway.

Safety: Data on total collisions in the corridor between 2005 and 2007 was collected from the California Highway Patrol. The highest number of collisions, ranging from 158 to 451, are found on I-580 westbound between I-680 and Hopyard (451 for the 3 year period), I-580 westbound between Hopyard and Hacienda (300 for the three year period), I-580 eastbound between Hopyard and Hacienda (162 for the three year period), and I-580 eastbound between Tassajara and El Charro (158 for the three year period). Compared to the statewide average of 0.91 collisions per million vehicle miles, the study corridor has a higher rate of 1.07.

The following conditions, described below and shown in Table 1, were observed for I-680 northbound:

Travel speed: During the morning peak period, traffic congestion occurs on the mixed flow lanes primarily between 8:00 and 9:00 a.m. with freeway speeds significantly reduced between the Mission Boulevard (south) and Andrade Road interchanges. No congestion was observed during the afternoon commute period and the carpool lane remains mostly in free flow condition throughout the morning and afternoon commute hours.

Travel time savings: The maximum travel time savings for vehicles using the HOV lane was over seven minutes during the a.m. peak period and one minute during the p.m. peak period.

Travel time reliability: During the hours of 8:00 to 9:00 a.m., the I-680 southbound corridor has the longest travel time, between 17 and 25 minutes. The afternoon travel time appears to be consistent, around 13 minutes.

Vehicle occupancy: In general, carpool vehicles with two or more passengers make up nine to fourteen percent of the total traffic composition. Truck traffic varies between four and six percent along the corridor.

Transit vehicles and passengers: Transit ridership in the study corridor is highest south of North Mission Boulevard, which can be attributed to VTA routes that connect the Fremont BART station to Milpitas and San Jose. Average daily transit ridership in the corridor ranges from 156 riders per day north of North Mission Boulevard to 2,811 between North Mission Boulevard and South Mission Boulevard to 2,014 south of South Mission Boulevard.

Safety: Data on total collisions in the corridor between 2005 and 2007 was collected from the California Highway Patrol. The highest number of collisions, ranging from 86 to 122, are found

between Andrade and Sheridan (88 for the 3 year period), North Mission and Washington (122 for the three year period) and Auto Mall and South Mission (86 for the three year period). Compared to the statewide average of 0.91 collisions per million vehicle miles, the study corridor has a lower rate of 0.61.

HOV Lane violation enforcement: The HOV lane violation rates on several of the corridor segments were significantly higher than expected. Violations ranged from as low as 7 percent to as high as 38 percent.

Caltrans submitted comments on the both Reports. The responses to the comments are attached and have been incorporated into the Final Report.

I-580 and I-680 Express Lane Before Study Conditions Comparison of Performance Measures							
	Performance Measure						
Study Corridors	**Travel Speed**	**Travel Time Savings**	**Travel Time Reliability**	**Vehicle Occupancy**	**Transit**	**Safety (collisions 2005-2007)**	**HOV Lane violation rate**
I-580 eastbound	AM: Freeflow PM:Congested	NA	AM: 14 minutes PM: 24 minutes	Carpools: 17-20% Trucks: 10-13%	729 to 1779 riders per day	158 -451 collisions Corridor rate: 1.07 State rate: 0.91	NA
I-580 westbound	AM: Congested PM: Freeflow	NA	AM: 20-22 minutes PM: 14 minutes	Carpools: 12-24% Trucks: 8-12%			NA
I-680 northbound	AM: Congested PM: Freeflow	AM: 7 min PM: 1 min	AM: 17-25 minutes PM: 13 minutes	Carpools: 9-14% Trucks: 4-6%	156 to 2881 riders per day	86 -122 collisions Corridor rate: 0.61 State rate: 1.07	7 to 38 %

Dowling Associates, Inc.
Transportation Engineering • Planning• Research • Education

April 10, 2009

Ms. Beth Walukas

Manager of Planning

Alameda County Congestion Management Agency

1333 Broadway, Suite 220

Oakland, CA 94612

Subject: Alameda I-580 Express Carpool Lane Project P08-078

Before Study – Existing Conditions

Responses to Comments from Caltrans District 4

Dear Ms. Walukas:

Dowling Associates is providing responses to comments on the "Alameda I-580 Express Carpool Lane Project: Before Study – Existing Conditions" dated March 2, 2009. The comments were made by Peter Lau of Caltrans District 4 Traffic Operations and transmitted in an e-mail from you on April 2, 2009.

Comment 1: As responded by Beth, if density is the determining factor of LOS, we recommend to incorporate density (or speed or both) information from the FREQ analysis in exhibits 53 through 56.

Response 1: The density information has been added to the relevant exhibits in the final report dated April 2, 2009. The exhibits which list LOS by segment from the *Highway Capacity Manual* (HCM) analysis using FREQ now include both density values and LOS for each hour rather than just LOS. The revised exhibits include Exhibits 53 through 56 (for the I-580 study corridor) on pages 52 to 57, as well as Exhibits 72 and 73 (for the I-680 control corridor) on pages 69 and 70.

The relevant exhibits in the final version of the "Alameda I-680 Express Carpool Lane Project: Before Study – Existing Conditions" dated April 2, 2009 have also been modified.

Comment 2: We also recommend to add description of a minor or emerging bottleneck near 1st Street to page 49, which consultant's speed data shows on exhibit 18 and FREQ on exhibit 51.

Response 2: Exhibit 18 indicates that several of the survey vehicles experienced slower speeds on eastbound I-580 near First Street during the P.M. peak period.

However, review of aerial photographs indicated that these slower speeds were related to interference from queues and congestion on the First Street off-ramp rather than a bottleneck on the mainline freeway. This explanation has been added to page 20 of the final report dated April 2, 2009.

Exhibits 51 and 54, which document the results of the FREQ analysis, also indicate slower speeds and LOS D to E operations on eastbound I-580 near First Street during the P.M. peak period. Text noting a minor bottleneck in that location has been added to page 50 of the final report dated April 2, 2009.

Comment 3: As responded by consultant for the 680 study, "The purpose of the control corridor <680 north of 580/680 I/C> is to determine if any changes in traffic operations between the "Before" and "After" study..." If so, we recommend to add the portion of 580 west of 580/680 I/C as control corridor for the same purpose.

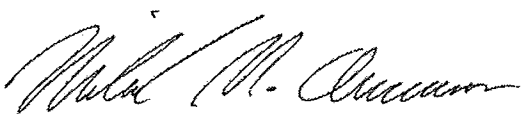
Response 3: A control corridor on I-580 west of I-680 was considered. However, this corridor was not selected due to ongoing construction on I-580 and SR 238 in the Castro Valley area. The construction could affect traffic patterns such that data collected at this time would not be representative of typical traffic operations. Therefore, the control corridor on northbound I-680 from SR 237 to I-580 was selected as a corridor serving many of the same general traffic patterns as the I-580 study corridor (commute home from jobs in Santa Clara County and southern Alameda County) without an existing HOV lane and without major construction during the survey period.

Text has been added to page 9 of the final report dated April 2, 2009 to explain why I-580 west of I-680 was not selected as the control corridor.

Please contact me at (510) 839-1742 ext. 119 or Allen Huang at ext. 123 if you have any questions.

Sincerely,

Dowling Associates, Inc.



Michael N. Aronson, P.E. Allen Huang

Principal Project Manager

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Dowling Associates, Inc.
Transportation Engineering • Planning • Research • Education

April 14, 2009

Ms. Beth Walukas

Manager of Planning

Alameda County Congestion Management Agency

1333 Broadway, Suite 220

Oakland, CA 94612

Subject: Alameda I-680 Express Carpool Lane Project P08-077

Before Study – Existing Conditions

Responses to Comments from Caltrans District 4

Dear Ms. Walukas:

Dowling Associates is providing responses to comments on the "Alameda I-680 Express Carpool Lane Project: Before Study – Existing Conditions" dated March 2, 2009. The comments were made by Caltrans District 4 staff and transmitted in an e-mail from you on March 6, 2009.

Comment 1: Page 13 cites both CMA's LOS criteria (which was based on HCM 1985 HCM) and HCM 2000 LOS criteria. Just to confirm, HCM 2000 criteria should be used for evaluation of Express Lane performance.

Response 1: There are a number of performance measures which can be used to assess traffic operations and corridor performance. Level of service (LOS) based on traffic density using the methodology specified in the 2000 *Highway Capacity Manual* (HCM) is one performance measure and is consistent with the methodology specified by Caltrans for traffic operations evaluation. This level of service methodology is included in the report, using the FREQ software as the analysis tool..

Travel speed is another performance measure that provides information on corridor performance. The Alameda CMA has an established methodology for measuring travel speeds using floating car surveys and documents the results in their level of service monitoring report every two years. The latest monitoring report was published on September 28, 2008. The Alameda County Congestion Management Program (CMP) established that measurement of LOS would be based on average travel speed, consistent with the method described in the "Manual of Traffic Engineering Studies". The "level of service" designation associated with these travel speeds is based on the 1985 HCM rather than the 2000 HCM. However, it is provided in order to allow comparison with prior Alameda CMA monitoring studies.

Comment 2: Miscellaneous typo on page 8- should be "I-680" instead of "Establish benchmark for the existing I-580..."

Response 2: The correction will be included in the final report.

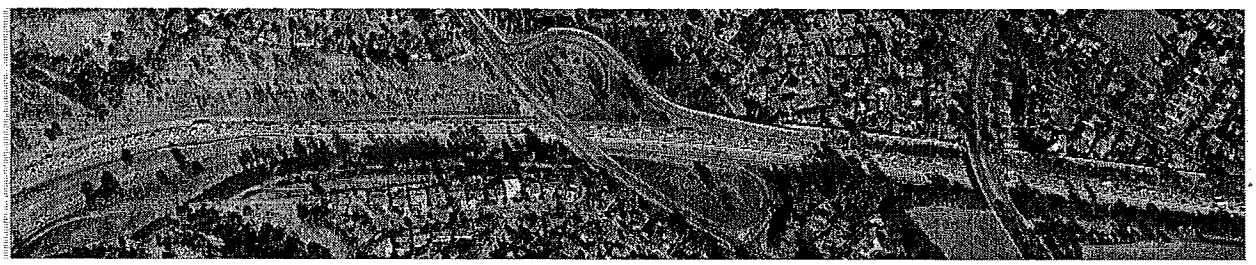
Comment 3: The identified bottleneck location is not consistent between the results of the Floating Car Survey Speeds and the Aerial Photo Survey. They are described below. Please recheck to see which bottleneck location is correct.

a) The speeds shown in Exhibit 7 indicates a bottleneck near the South Mission Boulevard interchange (SR 262) where the cars finally regain their speeds to near free flow condition. From 7 AM - 8 AM, the speed jumps back from 44 mph to 61 mph. From 8 AM - 9 AM, the speed jumps back from 36 mph to 61 mph.

b) The aerial photos in Exhibits 13 and 14 and the map on Exhibit 15 suggested a bottleneck location near the Washington Boulevard interchange. This location is contradicting to what is described above.

Response 3: The bottleneck locations and floating car survey information in the report are both based on correct information. However, Exhibit 13 on page 23 was labeled incorrectly. Exhibit 13 was titled "Aerial Photo Survey of AM Peak Hour at Mission Boulevard (south)" but the location shown on this aerial photo should be "Mission Blvd (north) – SR 238." The queue shown in the aerial photo is a continuation of a queue which forms at the actual bottleneck location at Washington Boulevard. An aerial photo of the major bottleneck location, Washington Blvd., is provided in Exhibit 13-A which will be included in the final version of the report.

Exhibit 13-A: Aerial Photo Survey of AM Peak Hour at Washington Blvd (9:07AM)

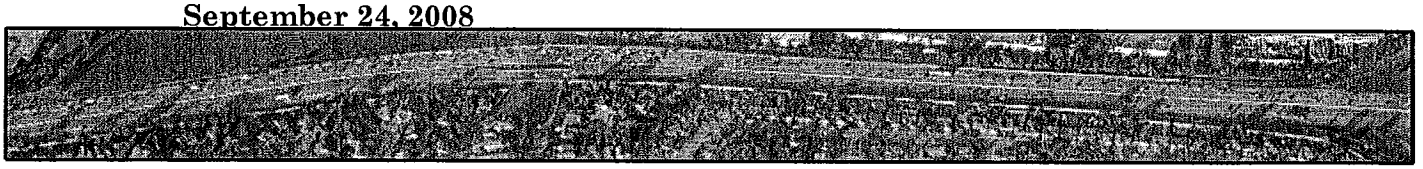


The slow speeds observed during the floating car survey at the south Mission Boulevard interchange are not caused by a bottleneck on the mainline freeway. There is congestion on the off-ramp to Mission Boulevard which directly affects traffic operations in the far right auxiliary lane (lane #5) and has some effect on traffic flows in the next two lanes (Exhibit 14-A). The aerial photos indicate a queue in Lane # 5 before the South Mission Boulevard interchange (SR 262) between 7:30 to 8:00 AM. The queue length was between 500 to 2,500 feet. During the most congested periods, the queue on lane # 5 could reach halfway through the segment

between the south Mission Boulevard interchange and the Auto Mall Parkway interchange (Exhibit 14-B).

Exhibit 14-A: AM Peak Hour at South Mission Blvd. (SR262) 7:50 AM, September 23, 2008

Exhibit 14-B: AM Peak Hour between SR-262 South Mission Off Ramp and Auto Mall Parkway (continuation of the previous photo) 8:00 AM, September 24, 2008



The traffic flows on the HOV lane (#1) and lanes #2 and #3 were not significantly affected by the off-ramp traffic exiting the South Mission Blvd interchange. The floating car traffic time survey picked up some delay on lane #4 (second lane from right - adjacent to the auxiliary lane). Thus, the floating car travel time runs showed the slower speed (between 36 – 44 mph). However, this slower speed does not represent a freeway mainline bottleneck and in this case does not fully represent the average travel speed in all lanes.

The FREQ model was calibrated to estimate the correct overall corridor travel time and also to replicate the observed queue location at Washington Boulevard. The FREQ model focuses on the mainline freeway and therefore does not represent the observed queue on the off-ramp at Mission Boulevard.

Comment 4: If it is determined that the bottleneck location is near the South Mission Boulevard interchange, the existing FREQ calibration model must be recalibrated.

Response 4: As noted in Response 3, the actual freeway mainline bottleneck was at Washington Boulevard. The FREQ model correctly represents this condition and should not need to be recalibrated.

Comment 5: A separate FREQ model on northbound I-680 north of I-580 is shown on pages 41 thru 46. We are not sure what advantages/conclusions this will bring to help support the southbound I-680 HOT lane project.

Response 5: The FREQ model for northbound I-680 is used to determine LOS based on density according to the HCM 2000 methodology for the northbound I-680 control corridor. The purpose of the control corridor is to determine if any changes in traffic operations between the "Before" and "After" study are due to the Express Lane project or other travel trends within the San Francisco Bay Area. When the

northbound I-680 control corridor is evaluated during the "After" study, the FREQ model can be used to determine LOS and compare the LOS to the results of this "Before" study.

Please contact me at (510) 839-1742 ext. 119 or Allen Huang at ext. 123 if you have any questions.

Sincerely,

Dowling Associates, Inc.

Michael N. Aronson, P.E.
Principal

Allen Huang
Project Manager

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